

BLACKSTONE RIVER FEASIBILITY STUDY

TASK B FINAL REPORT

1.0 Introduction and Purpose

The US Army Corps of Engineers, New England District (USACE/NAE) is conducting a multi-year feasibility study to identify watershed restoration opportunities in the Blackstone River Basin in Massachusetts. The goals of this study are to identify environmental restoration needs and opportunities in the basin, develop plans and cost estimates for restoration projects, assess benefits and costs of alternative restoration plans, select a recommended watershed restoration plan, and prepare appropriate NEPA documentation.

Epsilon Associates, Inc. has been subcontracted by Battelle to perform Task B as identified in the Scope of Work (SOW) for the Blackstone River Feasibility Study (USACE/NAE July 20, 1999). As defined by USACE/NAE, Task B includes a comprehensive inventory of impoundments to assess existing habitat and recreational value of each identified impoundment. Task B also qualitatively ranks the restoration opportunity at each of the identified impoundments within the Blackstone Basin.

2.0 Study Area

The geographic scope of Task B includes the entire Blackstone River Watershed located in Massachusetts. This study area encompasses 382 square miles in all or portions of 30 towns.

3.0 Site Selection Criteria

Under Task B, all impoundments on perennial tributaries within the Massachusetts portion of the Blackstone River Watershed were identified. Impoundments associated with the following areas were excluded from the inventory as directed by USACE/NAE:

- ◆ Impounded public water supplies identified in the Massachusetts Surface Water Quality Standards (314 CMR 4.06),
- ◆ Impoundments on the mainstem of the Blackstone River,
- ◆ USACE/NAE Flood Control Projects (West Hill Flood Control Project in Uxbridge).

4.0 Methodology

In identifying and prioritizing impoundments as potential restoration sites in the Blackstone River Basin, a four phased approach has been used. The first phase involved the procurement of existing information from a variety of sources. The second phase involved analyzing this information to confirm impoundments as potential restoration sites in accordance with the criteria outlined in Section 3.0. The third phase focused on field visits to each site for the purpose of collecting additional information and evaluating the site as a restoration opportunity. The final phase involved ranking each site based on site characteristics. The activities included in these four work phases are described below.

4.1 Information Procurement

Phase I is the information procurement phase. In this initial phase of the study, existing information on the Blackstone River Basin that is applicable to this project was collected and catalogued. Government agencies, academic institutions and non-profit organizations were contacted to identify information sources for the project, such as resource maps, watershed studies, aerial photography and other ongoing studies and projects. Some of the information sources used on the project include the following:

- ◆ Massachusetts Executive Office of Environmental Affairs, Blackstone Basin Team
- ◆ Blackstone River Watershed Association
- ◆ Massachusetts GIS Program
- ◆ Massachusetts Department of Environmental Management, Dam Safety Program
- ◆ Massachusetts Department of Environmental Protection (DEP) Bureau of Waste Site Cleanup
- ◆ Massachusetts DEP Wetlands and Waterways Program
- ◆ Massachusetts Division of Fisheries and Wildlife (MDFW) Riverways Program
- ◆ Massachusetts Historic Commission
- ◆ Massachusetts Natural Heritage and Endangered Species Program (MNHESP)
- ◆ Massachusetts Wetlands Restoration and Banking Program
- ◆ National Park Service (NPS) Blackstone National Heritage Corridor
- ◆ U.S. Army Corps of Engineers (USACE/NAE)

- ◆ U.S. Environmental Protection Agency (EPA), Blackstone River Initiative
- ◆ U.S. Fish and Wildlife Service (USFWS)
- ◆ University of Massachusetts Earth Science Information Office
- ◆ USDA Natural Resource Conservation Service (NRCS)
- ◆ U.S. Geological Survey (USGS)

Refer to Attachment A for a primary list of reference information used in identifying potential restoration sites for this project.

In addition to the sources described above, color infrared aerial photographs (1:40,000 scale) shot in the spring of 1991 and 1992, were obtained for use on this project. These photographs, which provide stereoscope coverage of the entire Blackstone River Basin, were used in conjunction with USGS Maps, NRCS county soil surveys, and other resource maps and reports to identify impoundments in the Blackstone River Watershed. The use of a stereoscope provided important information on topography and other physiographic features within the river basin study area. Acetate covers were overlayed on each photograph to facilitate the labeling of information directly onto the photo. The proposed labeling scheme included an abbreviation of the site type (I for impoundment) followed by a simple numbering sequence. (i.e., I-1, I-2 etc.).

4.2 Information Interpretation and Analysis

The second phase of the project involved the synthesis and interpretation of the data collected in the first phase (Section 4.1) for the purpose of identifying potential restoration opportunities as defined in Section 3.0. Once potential impoundment sites were identified, their locations were plotted on a base map comprised of USGS topographic quadrangles. This base map included all identified potential restoration sites.

During the data interpretation phase, field packets were also assembled for use by field staff. Each field packet contained information that assisted field scientists in locating, assessing and ranking identified impoundment restoration opportunities. Information was included in each packet to allow for 3 to 5 days of field investigations. Each field packet contained: USGS maps and aerial photographs with potential restoration sites identified; blank field forms; copies of road maps; and an assortment of natural resource information including fisheries, freshwater mussels and rare species information.

4.3 Site Evaluation

The information interpretation phase (Phase II) occurred sequentially with the site evaluation phase (Phase III) of the project. That is, as information interpretation was completed for each USGS Quadrangle study unit, the site evaluation for that unit commenced. This process was continued until the entire study area was covered.

Site evaluations were attempted at each identified impoundment by a two-person field team. The field staff completed an evaluation by filling out a field data form for each impoundment visited. The field form was developed for the project and requires the completion of data fields for including general site characteristics, surrounding land use, wildlife and fisheries habitat, and recreational and historic features. The field team spent approximately 45 minutes to 1 hour at each site and visited 6 to 8 sites per day. While conducting field evaluations of the predetermined restoration sites, other potential restoration sites were discovered that were not identified during the first two phases. These sites were included in the inventory if they met the criteria for site selection.

Field equipment used by field personnel included a global positioning system (GPS) receiver, field manuals, and a digital camera. The GPS equipment used on the project includes a Garmin GPS 12XL unit that provides at least 10-meter accuracy. Once on site, the field data forms were completed, a GPS point recorded, and photographs taken. The GPS information was used to produce geographic information system (GIS) maps showing each restoration site in the Blackstone River Basin. Photographs were taken from the GPS location and the direction of the photograph noted on the field form.

When it was not possible for the field team to directly access a site, observations were recorded from a distance to the extent possible. A group of sites were completely inaccessible due to the distance from between the site and a public road. Attempts were made to contact nearby landowners to obtain legal access. For a group of sites, the team was unable to secure legal access. For these sites, field forms were completed in the office using existing information including *An Inventory of the Ponds, Lakes, and Reservoirs of Massachusetts – Worcester County*. These sites are presented in this report as the inaccessible sites and were not included in the ranking.

4.4 Site Ranking Methodology

To assess the current habitat and recreational value of each impoundment, a scoring and ranking methodology was developed. This methodology was developed using other wildlife, fisheries, and water habitat assessment techniques and methods (see reference list in Attachment A).

The ranking process was developed for three identified functional attributes potentially important at each impoundment: wildlife, aquatics/fisheries, and recreational/historic. A three tiered ranking system was employed to rank the existing value of each attribute: high, medium, and low. For example, a site that scored and ranked high for wildlife had good habitat value, while a site that scored and ranked low for wildlife had low habitat quality.

For each attribute, a number of factors were identified as important indicators that contribute to the value of the attribute. For example, wildlife factors included habitat types, shoreline characteristics, and mean depth. To develop an attribute rank, each factor was scored on a point system that included a score of 3 for high, 2 for medium, and 1 for low. These individual factor scores were then added together to provide a total score for the attribute. The attribute score was then ranked as providing high, medium or low value based on the range of potential scores.

Using the scores obtained for each functional attribute, a total score was developed for the purpose of quantitatively ranking each impoundment's restoration potential. The total score for each impoundment was calculated by adding the three scores developed for wildlife, aquatics/fisheries, and recreational/historic values. Each total score was then ranked as providing high, medium or low restoration potential based on the potential range of total scores. As described above, a high score represented high qualities (wildlife, fishery, and recreational/historic) for the site while a low score represented low qualities for the site. Therefore, to appropriately rank the potential for restoration of a site, the ranking system was applied as the inverse of the total score. For example, a site that scored high in wildlife, fisheries, and recreational/historic quality was ranked low as a potential restoration site. Conversely, a site that scored low in wildlife, fisheries, and recreational/historic quality was ranked high as a potential restoration site.

5.0 Discussion and Results

Field work for Task B was initiated in the beginning of August of 2000 and was completed at the end of September 2000. As part of the initial identification of impoundments in the Blackstone Basin in Massachusetts, 124 impoundments were identified. Of this amount, 111 could be visited and evaluated. Information collected for the 111 sites is summarized in the final site list provided in Attachment B. Locations of these sites are identified on the orthophoto base GIS maps provided in Attachment C. Photographs of each site are included in Attachment D. Other potential restoration sites that have been identified, but could not be accessed, are identified on a list provided in Attachment E. These sites are located on a USGS base provided in Attachment F. A blank field form is provided as Attachment H of companion Volume II. Completed field forms for the 111 impoundments that have been field evaluated are provided in

Attachment I of Volume II. Partially completed field forms for inaccessible sites are located in Attachment J of Volume II.

Upon completion of all field work and site ranking, it was necessary to modify the ranking system. Because the ranking methodology was originally based on potentially observed scores and not on observed scores, a disproportionate number of sites ranked as medium on a low, medium and high scale. The primary reason for this is that the actual observed scores do not exhibit the range of potential scores and are more central to that range. To correct this problem a modification to the scoring/ranking system has been made. This modification ranked scores using a system based on actual scores rather than potential or hypothetical scores. Details of the modified scoring/ranking system are provided in Attachment G included in Volume II.